

Claims

1. An apparatus for generating a multi-component compound, in particular for dental purposes, comprising:
 - at least two cartridges (3), each cartridge (3) adapted for containing a component (4) of the multi-component compound and having a plunger (2) adapted for pressing out its component (4) from the cartridge (3); and
 - a driving device for said plungers (2) in which the driving speed is adjustable, wherein the driving device comprises a stepping motor (1), and a detector associated with the stepping motor for detecting at least one of
 - a) the steps of the stepping motor and
 - b) the load on the stepping motor.
2. An apparatus according to claim 1, wherein the detector detects the status of load by the step frequency of the stepping motor (1).
3. An apparatus according to claim 1 or 2, wherein the detector detects the increase of load by a change or loss of driving steps of the stepping motor (1).
4. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to drive the stepping motor (1) at a predetermined constant speed.
5. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to drive the stepping motor (1) at different predetermined essentially constant speeds for one or different components and compounds.
6. An apparatus according to anyone of the preceding claims, wherein a predetermined speed of the stepping motor (1) is essentially constant when the stepping motor (1) is under load and at a higher speed in the absence of load.
7. An apparatus according to anyone of the preceding claims, wherein the stepping motor (1) is able to drive the plungers (2) at low speed with high torque and at higher speeds.

8. An apparatus according to anyone of the preceding claims, wherein an output shaft (7) of the stepping motor (1) is connected directly, or via a belt, or via wheels and/or gear wheels and/or toothed chains and/or toothed belts, to each device (8) for moving the plunger (2).

5 9. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to monitor the position of the plungers (2).

10. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to monitor the position of the plungers (2) by monitoring the driving steps of the stepping motor (1).

10 11. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to detect and monitor an empty position of a plunger (2) when said respective cartridge (3) is empty.

15 12. An apparatus according to anyone of the preceding claims, wherein the driving device is adapted to detect when the plungers (2) get into contact with the components (4) after inserting the cartridges (3).

20 13. A method for generating a multi-component compound, in particular for dental purposes and particularly with an apparatus according to anyone of the preceding claims, by pressing out and mixing its components (4) from at least two cartridges (3) by driving plungers (2) inside the cartridges (3) by means of a driving device in which the driving speed is adjustable, wherein a stepping motor (1) for driving the plungers (2) is provided.

14. A method according to claim 13, comprising the steps that:

- the plungers (2) are advanced with high speed into an initial position in which they get in contact with the components (4);
- 25 – the plungers (2) are retracted with high speed for a predetermined relief distance;
- the plungers (2) are advanced with high speed either for a predetermined bias distance greater than the relief distance, or until the components (4) begin flowing out of the cartridges (3) or into the mixer (6);

- the plungers (2) are driven with low speed for pressing out the components (4) from the cartridges (3).

15. A method according to claim 13 or 14, comprising the steps that:

- during driving the plungers (2) with low speed for pressing out the components (4) from the cartridges (3), the pressing force or load of the stepping motor (1) is monitored and compared with a predetermined upper limit;
- if the upper limit is reached or exceeded, the stepping motor (1) is stopped or adjusted to a lower speed.

16. A system for generating a multi-component compound, in particular for dental purposes, with an apparatus according to anyone of the preceding claims 1 to 12 further comprising a mixer (6).

17. Use of an apparatus, a system and/or a method according to any of the respective preceding claims for generating, dispensing and/or mixing multi-component compound products.

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